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ABSTRACT

Basic features of a method of connection-making training, developed by Gordon and Poze, can provide a compact method of connection-making in varying mental age levels. Based on the premise that simple connection-making is innate and available to stimulation in children of the primary and kindergarten grade ages, this method was used on a target population of culturally deprived primary grade children in Lawrence, Massachusetts. Considerable emphasis was placed on getting students to initiate associative connections and to establish useful connections on their own initiatives. As a consequence this allowed students to experience expanded awareness of increasing personal importance. Self-worth was an influential factor in the improved connection-making abilities and thus, the learning abilities of those students. In addition, as useful as the method may be in helping children overcome learning disabilities, it can also be used to supplement teacher performance as well as to bring about concise staff communication and evaluation. (Author/EB)

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Synectics: A Connectionist Epistemic in the Future of Education

by

John K. Meyer

ABSTRACT:

There has been a strong tradition of associationist connectionism in American psychology and its forebears. But little has been done to articulate connectionist techniques. Gordon (Synectics, 1961) has developed connection-making training for reliable invention performance which can be expected to have a nation-wide impact on the cooperation between industry and education.

Basic features of the method provide for compact instruction in connection-making with school children. The method can be used to supplement teacher performance in teaching learning to learn and motivating conceptual learning, as well as helping to bring about concise staff communication and evaluation regarding these aspects of teaching.

This paper explains and documents an application in which the Gordon-Poze method overcame functional learning disabilities of the conceptual processes in underprivileged immigrant children. Experimental group improvements yielded significant t statistics ranging beyond 7 in five out of 13 standardized achievement subtests in grades K -- 3 with Title I children.

The method is being propagated by Gordon-Poze educational affiliates in Brazil, Israel, Mexico, and the United States.

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Synectics: A Connectionist Epistemic in the Future of Education

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There has been a strong tradition of associationist connectionism in American psychology and its forebears (Dewey, 1886); but little has been done to articulate connectionist techniques. Gordon (1961) has developed connection-making training for reliable invention performance (see Appendix, page 15) receiving world-wide application. The method is being propagated by Gordon's affiliates in Brazil, India, Israel, and Mexico as well as by his associates in the United States.

Basic features of the method developed by Gordon and Poze (Jiminez, 1977; 1975) can provide a compact method of connection-making in varying mental age levels. The method can also be used to complement teacher performance in motivating for conceptual learning and teaching learning to learn, and in bringing about concise, articulate staff communication and performance evaluation regarding these aspects of teaching.

In this paper I will outline, first, the theory and practice that led to a substantial improvement in the performance of Title I students in the Lawrence, Massachusetts schools. Next I will analyze some dynamics of the target population and explain the origins of its learning dysfunction. Finally I will analyze the example and indicate the relation of the method to the educational problem.

The Title I program in 1974-5 was conducted in part by SYNECTICS EDUCATION SYSTEMS, an establishment directed by Gordon and his longtime associate, T. Poze, which markets training and vehicles in the connection-making method. The 1974-5 program employed the explicit connection-making method developed by Gordon and Poze. This method is based on the premise that simple connection-making is innate and is available to stimulation in children of the kindergarten and primary

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grade ages (Gordon, 1961, page 113). Children say things like, "A cow is like a horse with horns;" "I feel sad, like a lion in a cage;" "Rain comes from a crying cloud;" and even as complex as, "My veins are like the pipes in a sink." Such associations constitute a bridge that normal children construct between what they already know and what they are trying to understand. However, the Title I children in the Lawrence project could not make even the simplest associations for learning.

Although teachers seem to like and to employ connection-making techniques (Dewey, 1886; Ausubel, 1963), they seem to lack information about the technique and to lack vocabulary to communicate it. They do not make explicit attempts, or do not know how, to train their students to make unique connections on their own initiatives, and they do not seem to expect to find text material capable of supporting such learning by initiative. Furthermore teachers may be reluctant to facilitate observation, prediction, control, and improvement of connection-making capacities, nor do they attempt to perfect a concept of the technique.

The Gordon & Poze system constitutes a method for teaching students to make their own, unique connections between what they are trying to learn and the facts and feelings with which they are already familiar (Gordon, 1965, page 103). Learning performed by purposeful connection-making is efficient because it makes explicit the otherwise implicit associative process by which conceptual or integrative learning is naturally performed. The human organism assimilates new things only by associating the new thing with something which is already familiar. Instead of waiting for a connection to happen, a student who uses the SES associative method can make one when he needs it.

The target population in this study consisted of culturally deprived primary

grade children who demonstrated pathologically poor learning skills. The students experienced such severe blocks against comprehension that a formal diagnosis of their condition replaced the word, "comprehension" with the word, "listening;" the implication being that the target population did not even know how to listen well enough to comprehend (SES, 1975a).

Because of time and money limitations, the input per student from the connection-making approach was not more than 40 minutes per day--in groups of fifteen to twenty children. A measurable contribution to these students' skill had to be brought about in less than a total of 30 hours of work. The target population received the same instruction in 1974-5 as in 1973-4 except for the addition of the training in connection-making.

Gordon and Poze looked for a breakdown of connection-making because they had observed that inability to make constructive, associative connections interfered with learning and communication skills. Therefore, the highest priority of this project was to help the target population relearn the skills of connection-making on an explicit basis.

Figure 1 shows an example of the kind of exercise used in the program. It introduces primary grade children to the idea of growth and form (Gordon & Poze, 1976, lessons 15-17). Since this particular lesson was used to diagnose associative skills, it is important to note that student resonses were so non-connective that no learning about growth could come about. Each teacher showed the class the "Egg-Seed" poster and said, "Look at the picture for a minute. How is the growth of the seed like the growth of the egg?" Here are some typical responses:

Julia: "The flower is best."
Tony: "The chick can walk."

Jose: "The chicken is smaller."
Sylvan: "There are no feathers on the flower."

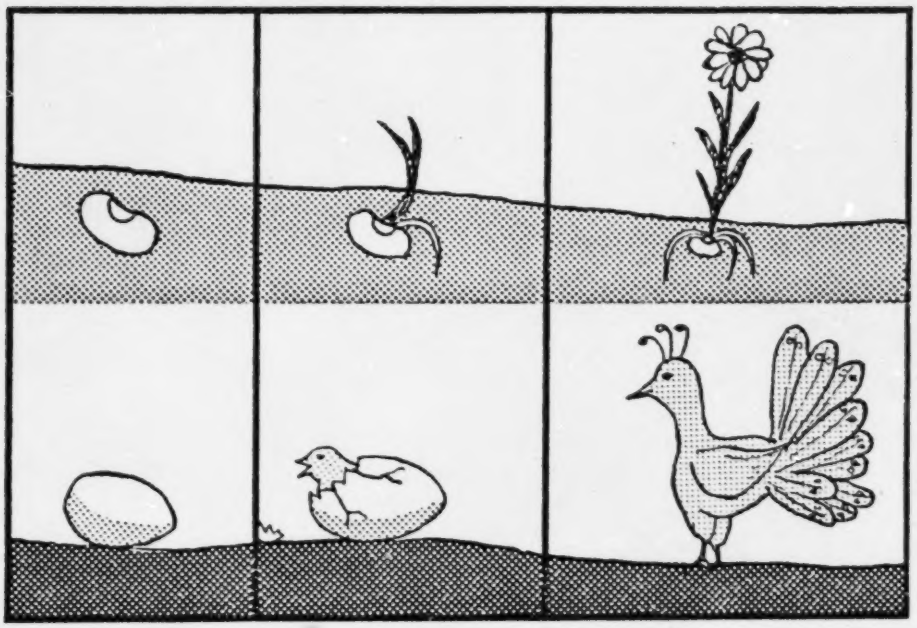

Figure 1. Egg-Seed Poster

The kind of connection being asked for was a mere comparison. However the children's non-connective responses indicated that they could not complete this simple learning task and that their learning process was severely disrupted. The associative breakdown diagnosed manifested itself and it was clear that the children would have to relearn their connection-making capacity.

What was the source of this breakdown? In general, the Title I students had low opinions of themselves and of their culture. The majority society had taught them to view their entire ghetto culture as unacceptable. Since their whole source of connections was something they preferred to forget and repress, their connection-making process was radically restricted. In particular, when

connective learning equations[1] lead to fun or reinforcement (cf. "hedonic response," Gordon, 1961, pages 28-29, 134-135, 155-157), learning is enhanced. However, since this kind of thinking led to pain instead, its use was extinguished and learning was blocked.

To help the children regain their connection-making capacity, they were led through exercises in which they practiced making explicit associations in many subject matter areas (Gordon & Poze, 1976; 1975). After the children had practiced explicit associative thinking, the teachers presented the Egg/Seed unit again, using the same procedure that they had observed when they first introduced the exercise. In fact, they simply followed the directions in the teachers' workbook guide (Gordon & Poze, 1972). First they asked, "How is the growth of the seed like the growth of the egg?" Of course responses varied, but all the students generalized some aspect of growth or form. These initial generalizations did not require the young students to draw on their own personal background and experiences. However after students expressed their initial grasp of a growth/form generality, they were asked to create their own connections. Here are some examples, starting with the children's responses to the teachers' first question as stated above and including the algebraic equations that are implied by the children's responses.

Julia: "Only the seed and the egg know what they'll be when they grow up. We don't. Something inside them must tell them."
Teacher: "Can you think of something that's like that, Julia?"

[1] A discussion of the algebraic nature of small children's thinking process is given elsewhere by Gordon (1977a).

Julia: "It's like Mr. Rogers on TV."
Teacher: "I guess we all know Mr. Rogers, Julia; but what does he do that is like the seed.?"
Julia: "He tells a story and only he knows how it'll come out."

$$\frac{\text{SEED}}{\text{FLOWER}} = \frac{\text{THE START OF MR. ROGERS' STORY}}{\text{THE END OF MR. ROGERS' STORY}}$$

Jose: "They are both quiet. Then they get to be happy."
Teacher: "What's like that that you know about, Jose?"
Jose: "The new wall by my house. They just painted it nice and clean and it looked very quiet. Then the big boys wrote funny things all over it."

$$\frac{\text{SEED}}{\text{FLOWER}} = \frac{\text{THE QUIET, CLEAN WALL}}{\text{THE FUNNY, MARKED-UP WALL}}$$

Tony: "They both start small and get big. It's a surprise."
Teacher: "Can you think of something else that acts like that?"
Tony: "My father."
Teacher: "How come?"
Tony: "When he's mad it starts out a little mad . . . and gets madder and madder."

$$\frac{\text{SEED}}{\text{FLOWER}} = \frac{\text{FATHER JUST A LITTLE UPSET}}{\text{FATHER GETS VERY ANGRY}}$$

Sylvan: "They both have to crack to grow."
Teacher: "Sure enough, Sylvan. What else does that?"
Sylvan: "When the pipes froze at home."
Teacher: "What did happen, Sylvan?"
Sylvan: "The fireman told me that when the heat went off the ice wanted to get out so much that it burst the pipe."

$$\frac{\text{SEED}}{\text{FLOWER}} = \frac{\text{UNCRACKED PIPE}}{\text{PIPE BURST WITH ICE COMING OUT}}$$

Let's examine this process to derive a firmer idea about the underlying structure of associative thinking. Sylvan, for example, was asked how the seed is like the egg. He looked at the illustration and saw that both the flower seed and the bird egg must crack in order to mature. Here's the form of Sylvan's connection-making.

$$\frac{\text{GROWTH OF SEED}}{\text{SEED CRACKS}} = \frac{\text{GROWTH OF EGG}}{\text{EGG CRACKS}}$$

A very simple process so far; but what happened when this student invented his

own private connection? The child was asked to think of something he knew about that grows in a parallel way to the seed and egg. Here is his thinking process depicted with a third equality:

$$\frac{\text{GROWTH OF SEED}}{\text{SEED CRACKS}} = \frac{\text{GROWTH OF EGG}}{\text{EGG CRACKS}} = \frac{\text{GROWTH OF ICE}}{\text{PIPE BURSTS}}$$

Certainly there was nothing remarkable in the student's response: a simple connection between how seeds and eggs grow and how ice cracks a pipe. However, since Sylvan put his understanding into his own terms, he was epitomizing a highly efficient form of learning. He explicitly attached the new content to something that was already part of his experience. This activity is what the entire target population was taught to do in the program.

Tables 1 and 2 (pages 9 & 10) can be used to estimate the influence of the connection-making method on learning among the culturally deprived in grades K--3. These findings were obtained from project evaluation data (Heuristics, Inc., 1975; 1974). The 3-month and 6-month achievement (preceded by pretests and followed by post-tests) of the 1973-4 group were prorated to approximate the 7-month achievement of the 1974-5 group. Standard error quantities were reconstructed from evalution statistics for the two school years reported by Heuristics, Inc. One-tailed t-tests of significance were used.

As indicated by the pretest achievement levels in Table 2, the 1974-5 pupils offered a much lower level of initial readiness than the 1973-4 pupils. The connection-making method had its impact (see Table 1) on the achievements in the first grade in Word Reading and Letters and Sounds; in the second grade, on Total Reading Score, and in the third grade, on Word Study Skills.

The connection-making method increased the Word Reading achievement of the first grade children by 148%; that is, the difference between the post-test

and pretest levels with the connection-making method was 2.48 times the difference between the post-test and pretest levels without connection-making. The post-minus-pretest achievement difference in Letters and Sounds was increased by 93%.

In the second grade the connection-making method increased Total Reading Score achievement by a statistically significant improvement of 32%, and a modest improvement differing little from probable chance in Reading Comprehension. Studies sponsored by the U. S. Office of Education (USOE) have found that the greatest effectiveness of the prevalent educational innovations of the late 1960's and early 1970's took place in second grade reading (American Institutes for Research in the Behavioral Sciences; AIR, 1976).

In the third grade the achievement pattern showed a statistically significant improvement of 40% in Word Study Skills achievement associated with the connection-making method and a negligible increment in Total Reading Score.

Comparing the connection-making method and the other Title I instruction indicates that the Title I instruction was designed to provide the culturally deprived child with a larger share of what American educators believe to be best about the established system. The project reports (Heuristics, Inc., 1975; 1974) include an assessment of teacher credentials indicating a high proportion of reading teachers, a class size averaging eight pupils, frequent standardized testing, and adequacy of heating, lighting, ventilation, and of cabinet space for audio-visual aids.

The Gordon-Poze connection-making method, on the other hand, is a highly developed procedure designed to ensure that, first, the student will initiate associative connections; that, second, he will establish useful connections on his own initiative; and that, finally, he will experience expanded aware-

Table 1

Comparing Connection-making Influence (1974-5) on K--3 Achievement with other Title I Influence (1973-4) in Lawrence, Massachusetts

Test/Subtest	Achievement Differences: Raw Score[a]	Per Cent Improvement	t	P (One-tailed)
FIRST GRADE				
Stanford Early School Achievement Test, Level II/				
Letters and Sounds	7.53	93	4.94	.0000
Word Reading	20.70	148	7.49	.0000
(Not significant: Aural Comprehension and Word Reading subtests)				
SECOND GRADE				
Stanford Achievement Test (1973 ed.), Primary Level I/				
Reading Comprehension	3.93	13	1.35	.0885
Total Reading Score	10.92	32	2.30	.0107
(Not significant: Vocabulary and Word Study Skills subtests)				
THIRD GRADE				
Stanford Achievement Test (1973 ed.), Primary Level II/				
Word Study Skills	4.25	40	2.44	.0073
(Not significant: Vocabulary and Reading Comprehension subtests and Total Reading Score)				

[a]1973-4 achievement (i. e., pre- post-test) period prorated to equivalent of 7-month 1974-5 achievement period (see also Table 2, next page).

ness of increasing personal importance as a consequence. The Gordon-Poze connection-making method involves the development of self-concept and a sense of personal worth in the educational impact.

In conclusion, connection-making, first, enhances the resources of the student in concept formation learning and in developing the capacity for

Table 2

Pre-test Score Means for SES Connection-making (1974-5) and Title I (1973-4) Pupils

Test/Subtest	Pretest Levels		
	1974-5	1973-4	
		Raw	Extrapolated[a]
FIRST GRADE			
Stanford Early School Achievement Test, Level II/			
Letters and Sounds	17.76	30.48	28.23
Word Reading	12.71	44.23	36.23
SECOND GRADE			
Stanford Achievement Test (1973 ed.), Primary Level I/			
Reading Comprehension	26.67	44.22	39.82
Total Reading Score	64.27	88.41	83.58
THIRD GRADE			
Stanford Achievement Test (1973 ed.), Primary Level II/			
Word Study Skills	34.15	38.17	36.66

[a]To equilibrate pretest level of 1974-5 7-month achievement period.

learning to learn. Further, the connection-making method enhances student performance at the three levels of spontaneous response, of a sense of craftsmanship and confidence, and of a group sense of achievement.

A second benefit is enlarging the field of the teacher's influence in the classroom through the use of connection-making workbooks (Gordon & Poze, 1976; 1975; 1972; 1971). A teacher can reach more pupils, and in a smoother treatment, than through personal contact. Teachers may not expect textbooks to be able to provide individualized, explicit assistance in motivation for conceptualization or in learning to learn. Such workbooks may nevertheless help sustain students in task relevant attitudes even when the teacher is unable to spare time for the individual student, or is temporarily absent due to illness.

Third, teachers and principals together in a teaching staff can make their

performance more institutionally stable and more clinically incisive. They will be better able to communicate aboiut the achievements and the problems of education within their school and classrooms, to improve their impact on existing problems, and to indicate the scope and substance of their performances (Gordon, 1977a; 1961).

In the contingency previously mentioned that teachers are already using the method but without explicit information or vocabulary, the introduction of the Gordon-Poze method as an innovation may lead to confusion. On the other hand, the introduction of the explicit information and the vocabulary as an aid to communication, may permit consolidation of unrecognized teaching capacities and bring about improvement in the institutional and clinical responsiveness of the staff as a whole.

Fourth, the articulation of the skills of teaching motivation for conceptual learning and for learning to learn will permit the development of improvements in the performance evaluation of teaching and learning (Gordon, 1977a; 1961; Joyce & Weil, 1972).

Fifth, the articulation of these skills will also permit the development of logistic accuracy required in turn to develop concise trade-offs in class-size, in costs to and values received by the student and community, and in information relevant to bargaining tasks undertaken by teacher association officers and school board members.

Sixth, the articulation of attitudes and values associated with conceptual learning skills and with learning to learn may permit the development of cogent principles relating the professionalization of teaching to the professionalization of quantity-keyed industrial and commercial management, and may in turn permit

the reduction of problems of communication and disagreements between the teaching profession on the one hand and the management profession on the other, as foreseen by Drucker (1968).

These are areas to which further research should be directed.

References

American Institutes for Research in the Behavioral Sciences. Impact of Educational Innovation on Student Performance: Project Methods and Findings for Three Cohorts. Project LONGSTEP Final Report: V. I, Executive Summary. (Palo Alto, CA 94302: American Institutes for Research Behavioral Science and Technology Group, 1976).

Ausubel, D. P. The Psychology of Meaningful Verbal Learning (New York: Grune & Stratton, 1963).

Dewey, J. Psychology (New York: Harper Brothers, 1886).

Drucker, P. F. The Age of Discontinuity (New York: Harper & Row, 1968).

Gordon, W. J. J."Toward Understanding 'The Moment of Inspiration'." Paper delivered to Creativity Symposium of the American Association for the Advancement of Science, 1977(a). (February 21).

Gordon, W. J. J. "Connection-making is Universal," Curriculum Product Review 9:4 (April 1977)(b).

Gordon, W. J. J. "Use of Metaphor Increases Creative Learning Efficiency," Trend: (Spring, 1972):11-14.

Gordon, W. J. J. "The Metaphorical Way of Knowing." In Kepes, G., Ed., Education of Vision (New York: Braziller, 1965).

Gordon, W. J. J. Synectics (New York: Harper & Row, 1961).

Gordon, W. J. J., & Poze, T. "Learning dysfunction and connection-making," Psychiatric Annals 8:3 (1978): 79-88.

Gordon, W. J. J., & Poze, T. Strange & Familiar, Book I (Cambridge, Mass.: Porpoise Books, 1976).

Gordon, W. J. J., & Poze, T. Strange & Familiar, Book III (Cambridge, Mass.: Porpoise Books, 1975).

Gordon, W. J. J., & Poze, T. "Learning is Connection-making," Professional Report (Waterford, Ct.: NIE Croft Publications, 1974). (February).

Gordon, W. J. J., & Poze, T. Teaching is Listening (Cambridge, Mass.: Porpoise Books, 1972).

Gordon, W. J. J. (Poze, T., Rsch. Ed.). The Metaphorical Way of Learning and Knowing (Cambridge, Mass.: Porpoise Books, 1971).

Heuristics, Inc. Evaluation of the Lawrence Title I Project, 1974-5 (Wellesley, Mass.: Heuristics, Inc., 1975).

Heuristics, Inc. Evaluation of the Lawrence Title I Project, 1973-4 (Wellesley, Mass.: Heuristics, Inc., 1974).

Jiminez, J. "Piaget and Synectics." In Magary, J. F., Poulsen, M. K., Levinson, P. J., & Taylor, P. A., Eds., Piagetian Theory and its Implications for the Helping Professions: Emphasis: the Handicapped Child 6 (Los Angeles: University of Southern California, 1977): 384-393.

Jiminez, J. "Synectics: A Technique for Creative Learning." The Science Teacher (March, 1975): 33-36.

Joyce, B., & Weil, M., Eds., Perspectives for Reform in Teacher Education (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1972).

Papanek, V. J. "Solving Problems Creatively," Management Views 9:3:2 (Ft. Belvoir, Va: U. S. Army Management School, 1964): 169-196. (Note: Transcriptions of selected oral presentations for the year 1963-4.) Quoted in Prince, G. M., The Practice of Creativity (New York: Harper & Row, 1970): footnote 5, 72.

Synectics Education Systems. "Listening/Expression Project Proposal submitted to the Lawrence, Mass. Public Schools" (Cambridge, Mass.: Synectics Education Systems, 1975a).

Synectics Education Systems. "Follow-up Listening/Expression Project Proposal Submitted to the Lawrence, Mass. Public Schools" (Cambridge, Mass.: Synectics Education Systems, 1975b).

Appendix A

Some Inventions Produced by Invention Clients Trained in Explicit Connection-Making

1. Vapor-proof closure for astronaut space clothing.
2. Inflatable buildings for the Distant Early Warning (DEW) Line.
3. Automatic piston manufacturing for automobile industry.
4. Method for healing wounds faster.
5. Eating system for astronauts in space.
6. The skin-softening soaps.
7. "Dial-your-own-octane" gasoline pumps
8. Conceptualization of Israeli economy and career patterns as a source of research-and-development products for other countries.
9. The "Pringle Newfangled" type of potato chip manufacturing method.
10. Operating-room table covers.
11. Video record.
12. Effective middle management decision-making process for very large groups.
13. Automatic liquor-dispensing equipment for bars.
14. Meter for identifying safe automobile drivers.
15. Disposable baby bottle with formula.
16. Disposable diapers
17. Living paint.
18. Jet marine engine.
19. Safe saw (cuts wood, but not flesh).
20. Trash masher.
21. Carburetion for gasoline-fueled, limb-lopping axe.
22. Solution to the problem of inducing teachers to stay in a school with a high percentage of disruptive students.
23. Electric carving knife.
24. Concept for renewal of centers of old cities.
25. Menstrual pain reliever.
26. Electric can-opener.
27. Ice maker.
28. Design of compact Kleenex box.
29. Constructive oxidation of iron to prevent dangerous rusting.
30. A new capital funding process for an organization unable to follow usual capitalization paths.
31. An effective growth method innovation for an organization with no growth for 20 years.